ATT Response
to the
NCCA 'Technology Education in the Junior Cycle' Consultation Document

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The Association of Technology Teachers (ATT) welcomes the opportunity to contribute to the consultation process instigated by the NCCA on Technology Education in the Junior Cycle: A Framework for Provision. The document, published in March 2003 marks a further step in the process of the development of science and technology education provision at junior and senior cycles. While this document specifically targets junior cycle technology education provision, ATT views this in the broader context of second level education and beyond. This consultation takes place in the context of significant national concern expressed about declining uptake of science subjects at senior cycle level. The introduction of science as a subject to the primary curriculum is also relevant.

ATT sees the provision of technology education as part of a holistic curriculum whose primary focus is the education of the young person as they develop from childhood through adolescence to adulthood. The provision of technology education must acknowledge the history of education which each child brings with them on entering second level and the future that lies ahead of them at third level and beyond in their prospective careers. Technology education at second level will be greatly enhanced by being harmonised to the most feasible extent with related developments elsewhere. Technology education is of the person and for the world in which they live.

The Document

ATT welcomes the NCCA discussion document and agrees with the broad thrust of the proposals. The concept of a core subject with option-extensions, the core being mediated through the selected options, seems a practical and effective means by which to reconcile existing curricular provision and develop technology education.

It has to be noted that the consultation document merely outlines, in the broadest of terms, the content of the core and option-extensions. There is a risk that individual teachers could produce distinctively personal interpretations of the core in the context of the subject as they teach it. For the student who is taking two subjects from the technology sector it would be desirable that the core as experienced in one mediation should be familiar when encountered in another mediation. Equally there should not be so much repetitive overlap that the student is duplicating significant areas of work in his / her studies. The specification of the content and the presentation of subject pedagogy through continuous professional development (CPD) courses will need to be carefully considered to ensure that these concerns are adequately addressed.

The presentation of the subject, the marketing of it as it were, to students, teachers, parents and school managers will be critical to its success.

Rooms and resources. At present there are two broad categories of school in terms of resourcing. In the first category are schools which have been teaching the existing subjects of Materials Technology Wood and Metalwork. These schools will typically have rooms fitted out for the purpose of teaching these subjects. They are also likely to have teachers specifically qualified to teach said subjects. In the second category

are schools which entered the field of technology education by adopting the subject Technology at Junior Cycle. Such schools are typically from the voluntary secondary sector and in many cases had no history of involvement in technology education. They began teaching the subject in rooms hastily converted and poorly equipped for the purpose. These schools have provided a valuable service to Irish education in the thirteen years since the subject technology was introduced. As a matter of justice and equity they must be given the opportunity of upgrading their facilities to allow them to reach the standard of resourcing found in the more established schools providing technology education for their students. Furthermore, existing schools without current provision for technology education should be funded at a realistic level such that the capital and running costs for introducing a technology subject would be full met.

Given that the proposed development of junior cycle technology education will likely be implemented simultaneously with developments at senior cycle there may an opportunity to solve the historical deficits of the former when in implementing the latter. Nonetheless schools which choose not to take up senior cycle Technology immediately though continuing to provide junior cycle Technology should not be penalised through a lack of investment in resourcing. If they are neglected at such a time they are less likely to proceed to senior cycle and more likely to consider dropping the junior cycle subject as well.

The format of the discussion document, including the statement of learning outcomes is also welcome. ATT believes that the inclusion of learning outcomes must be integrated with the development of assessment instruments and processes. These developments should occur within the context of a pedagogical approach to the teaching and learning of technology subjects.

The consultation document makes reference to issues of health and safety. ATT regards health and safety in the technology subject classroom as a fundamental issue. While consideration should be given to the design of the technology room and to the specification of the equipment to be used within it, the specific training of technology subject teachers ahs been neglected for too long. ATT believes that the issue of providing technology subject teachers with an adequate health and safety training should be addressed as a matter of urgency.

ATT notes that a number of significant issues have not been specifically addressed in the discussion document.

- **Gender equity**: the subject Technology has been very successful in encouraging female participation with sustained rates of approximately 30% being achieved. This is due in part to the uptake of the subject in all-girls schools and also to the fact that the subject has appealed to girls by virtue of its flexible content, its design based working and its project based working allowing for personalisation of approach. The gains in gender inclusion have not been accidental. Gender equity and the inclusion of females should be researched and addressed specifically as part of the development of technology education as proposed in the consultation. Serious consideration must be given to the development of effective strategies for the

encouragement and inclusion of female students. For example, the document lists only 3 option-extensions of which two are traditional material based and craft oriented. Further options designed with the aim of inclusion should be developed for inclusion.

- **Teacher development:** the successful introduction of the subject Technology has been assisted in large measure by the dedication and commitment of a cohort of teachers who have given freely of their time, have subsidised the costs of their own education and have tolerated, in many cases, inadequate resourcing and facilities. The achievements of this cohort need to be recognised, acknowledged and included in future planning. ATT recommends that the needs of this cohort be specifically addressed in the discussion of future provision of ICD / CPD and that the specific needs of 'unqualified' teachers of technology be taken into account and provided for.

- **Resourcing:** the subject Technology is a relatively expensive subject to implement and support in the curriculum. The capital and running costs of the subject are significant. In some cases schools have had to resort to the practice of levying charges on students to cover the costs of the materials used, especially in the case of exam project work. ATT regards these charges as inequitable and unfortunate. They can act as a disincentive to students, who have to pay them, and teachers, who have to collect them. ATT believes that all students should have free access to subjects within the curriculum. It should be a matter for management, in consultation with the DES, to decide how resources should be allocated. No one subject should be singled out for selective charging.

- **Funding technology education:** ATT believes that developments within the curriculum sector of technology education should be adequately resourced and funded. The experience of the initial introduction of the subject Technology from 1989 with a single capital grant of €6,348 has shown the inadequacy of this approach. At that time the estimated cost of establishing the subject in a 'new' school was €38,000. ATT would like to see the preparation and agreement of a suitable funding and resourcing strategy to support the development of technology education in the curriculum. Provision must be made for capital investment, running costs and periodic reinvestment to replace and update equipment.

- **Subject individuation**: the consultation document proposes the development of the core and option-extensions based on the established subject areas of Materials Technology Wood, Metalwork and Technology. Given the distribution of these subjects in schools at present and the teacher qualification profile, it is to be anticipated that many schools and teachers will opt to provide technology education through the mediation of wood and metal. This of itself is not an issue. ATT would be concerned that the core and option-extension based on the established subject Technology could suffer a decline in uptake due to problems already mentioned with facilities, resourcing and teacher supply. ATT therefore recommends that a clear strategy be discussed and agreed to ensure that technology education is provided as range of

options, each clear and attractive in itself; each strongly supported by appropriate strategies for resourcing and teacher development and for consolidating the curricular gains made in the past decade..

Specific response to the consultation document

In responding to the consultation document we have chosen to bypass the questionnaire format. We felt that as the document provided a general framework rather than a closely specified plan, it would be more appropriate to keep our commentary at the level of the overview. Nonetheless we have identified areas within the consultation document on which we would wish to comment.

Overall, in terms of the opinion range from 'excellent' to 'poor' we would rate our response as 'good', but! We recognise the thrust of the framework proposed and acknowledge the time and effort taken in bringing the process to the advanced stage which it now has reached. We commend the hard work and effort of all those involved.

The core, as specified, is at once familiar and challenging. There seems to be adequate content in terms of knowledge and understanding, sufficient skills in terms of the challenge posed to the student as learner at junior cycle. ATT recognises the distinct opportunity afforded by technology education where the student is realistically challenged in the cognitive, affective and psychomotor domains. This subject area can provide for a range of learning styles and multiple intelligences (Gardner 1984) and has the potential to boost student uptake in the science and technology curriculum sector.

The summary of the core included between pages 6 and 11 of the consultation document is broad in its coverage. The content listed is good and the breadth and balance commendable. Much will depend on how the core is specified in the detail of the syllabus to be written, glossed in the teacher guidelines to be developed and presented to teachers and the wider education community through training and promotion programmes. ATT sees the provision of technology education at junior cycle as a continuum from primary to third level. That continuum must be experienced by the student as a logical and coherent progression from level to level, subject to subject, course to course. The paths of progression through technology education should be clear from primary induction to third level graduation and beyond.

Length of course: ATT is concerned that the present level of work, the standard set especially in project work at junior cycle technology is in some cases unduly high. This may be explained by the fact that as there is no senior cycle Technology subject the level at junior cycle has continued to climb unchecked. It would be important when revising the subject provision at junior cycle to encourage a standard appropriate to the subject, level and student ability at ordinary and higher levels. Attention should also be paid to training teachers in classroom management such that the subject, especially project work, is effectively handled.

Guidance on approaches to the core and option-extension. ATT is concerned that guidance should be provided to teachers on what constitutes and acceptable approach to teaching the subject. For example in the early days of the subject Technology the prevalent view was that students should build solutions from components: system solutions (e.g. ready built gearbox) were frowned upon. As the subject area moves on to senior cycle it is to be anticipated that system solutions will become acceptable insofar as they are the components of more complex solutions (e.g. students could use complex i/cs to build more complex circuits). It is unlikely, even undesirable that this question be answered definitively. It is of the nature of technology education that the content and methodologies will change in line with developments in the commercial and industrial worlds. ATT believes that it is essential that the technology education curriculum be adaptable and open to change and development in line with practice in related fields. It would be important to have a line of communication between curriculum bodies and teachers such that an ongoing critical dialogue be maintained, thereby ensuring that classroom pedagogy keeps pace with contemporary developments elsewhere. Technology education, especially, cannot be allowed to languish at the point of its last syllabus publication.

Core – Development of initial knowledge and skills

The consultation document addresses this area adequately though ATT would have specific concerns regarding the mediation of the subject through the practical domain. Skills are acquired through practice. Practice is performed on the materials, machinery and equipment which are provided. As an issue of equity ATT would expect that all schools offering technology education would be equipped to an acceptable level in terms of the quality and quantity of machinery and resourcing provided. ATT has serious reservations about the use of substandard, insufficient and inadequate equipment in technology classrooms.

Core – Design process and communication

The consultation document addresses this area adequately though ATT would have specific concerns regarding the balance to be set between hand and machine produced work. With specific regard to assessment, design work produced on (CAD) machines and hand drawn work will need to be assessed equitably. Consideration must be given to how this is to be achieved. Perhaps a system of weightings could be explored to ensure that the relative effort and accomplishment of student's work is acknowledged.

Core – Energy

ATT would like to see reference to alternative energy in the context of the Kyoto agreement and the political obligations of governments and societies to develop responsible energy policies.

Core – Technology, Society and the Environment

ATT would like to see reference to the historical, especially the Irish historical context of technology. Provision should also be included for updating this section in line with contemporary developments.

Option 3 – Energy and Control

In the section on energy ATT would like to see more reference to design as a fundamental aspect of coursework. E.g. modify the final phrase in the Energy Sub-topic section on page 18 to read: 'circuit design assembly and testing'.

In the section on 'Control' include reference to logic processes with reference to gates, robotics, mechanical, electric and electronic control.

ATT would also like to see reference being made to the study of Structures with particular reference to principles of structural integrity, the principal categories of structures and an exploration of the different forces operating in structures.

In the 'Learning Outcomes' section add two outcomes as follows:

- Refinement of manufacturing and assembly skills
- Demonstrate selective use of suitable energy and control systems.

Suggestions for other options to be developed.

ATT does not wish to be prescriptive at this point as it is of the essence of technology education that new fields of study will emerge in time. The syllabus should be flexible enough to allow for development of new syllabus areas as and when they become justifiable for inclusion.

Some suggestions worth considering include:

- Biotechnology (e.g. with reference to waste management)
- Food technology
- Assistive technology for disability and special needs
- Alternative technology for application in developing countries
- ICT
- Web design

- Virtual design and manufacture using proprietary software.

- Etc. etc.

In each case the syllabus and project work required would need to be adequately specified and sufficiently demanding to pose a credible challenge for students at junior and senior cycles respectively.

Assessment

ATT is satisfied with present arrangements for assessments and recommends that a balance of 50% theory and 50% practical (project) work be maintained in the apportionment of marks for final examination at higher level and the 40% - 60% breakdown at ordinary level.

ATT would also like to see a system set up whereby feedback could be provided to teachers on the annual assessment of technology education subjects, in our case, Technology.

School resources

Reference has been made to this topic earlier in this response. ATT is seriously concerned at the serious under-funding of technology education. The lack of a coherent system of continuous professional development for teachers is also a matter of considerable concern. Technology is a key factor in Ireland's considerable economic success. It is no less than essential that technology education be adequately funded at all levels of education, particularly in this instance at second level.

Professional needs of teachers

Reference has been made to this topic earlier in this response and also in the earlier submission by the 3 subject associations, "Teaching the Technologies at Second Level Strategies for Development" (2002). The professional needs of teachers are considerable and have been under addressed heretofore. In that document a comprehensive strategy was outlined for addressing the professional development needs of teachers. ATT regards it as fundamental and essential that a comprehensive programme of provision be put in place to ensure that teachers are adequately supported. The prospect of the imminent introduction of the subject Technology to the senior cycle should afford the opportunity to remedy shortcomings of provision of teacher professional development support at junior cycle.

Conclusion

ATT are pleased that this consultative process is underway and looks forward to an early outcome. The consultation document is welcome though perhaps restrained in its vision. The picture presented in the document is readily familiar as a revision of the status quo with modest and understated ambitions for the future. As the process continues ATT would like to see a more assertive and anticipatory approach to the inclusion of new technologies. There are whole fields of technology at which our students are proficient which have yet to appear within the covers of a syllabus or the confines of the classroom. Our young scientists, our web designers, our computer gamers and programmers, our robot builders and many more should find support and encouragement within the technology education provision of our schools. Our teachers should be supported to understand and enable our best students to realise their technological ambitions.

ATT is particularly interested in seeing that the momentum already established with regards to the development of technology education at senior cycle be maintained and continued. Our students need it. Our teachers expect it. Our country awaits it.

References

Gardner, Howard (1984) Frames of Mind, London, Fontana Press

Teaching the Technologies at Second Level Strategies for Development: A Proposal submitted jointly by the AMTGT, ATT and ETTA to NCCA and DES (2002)